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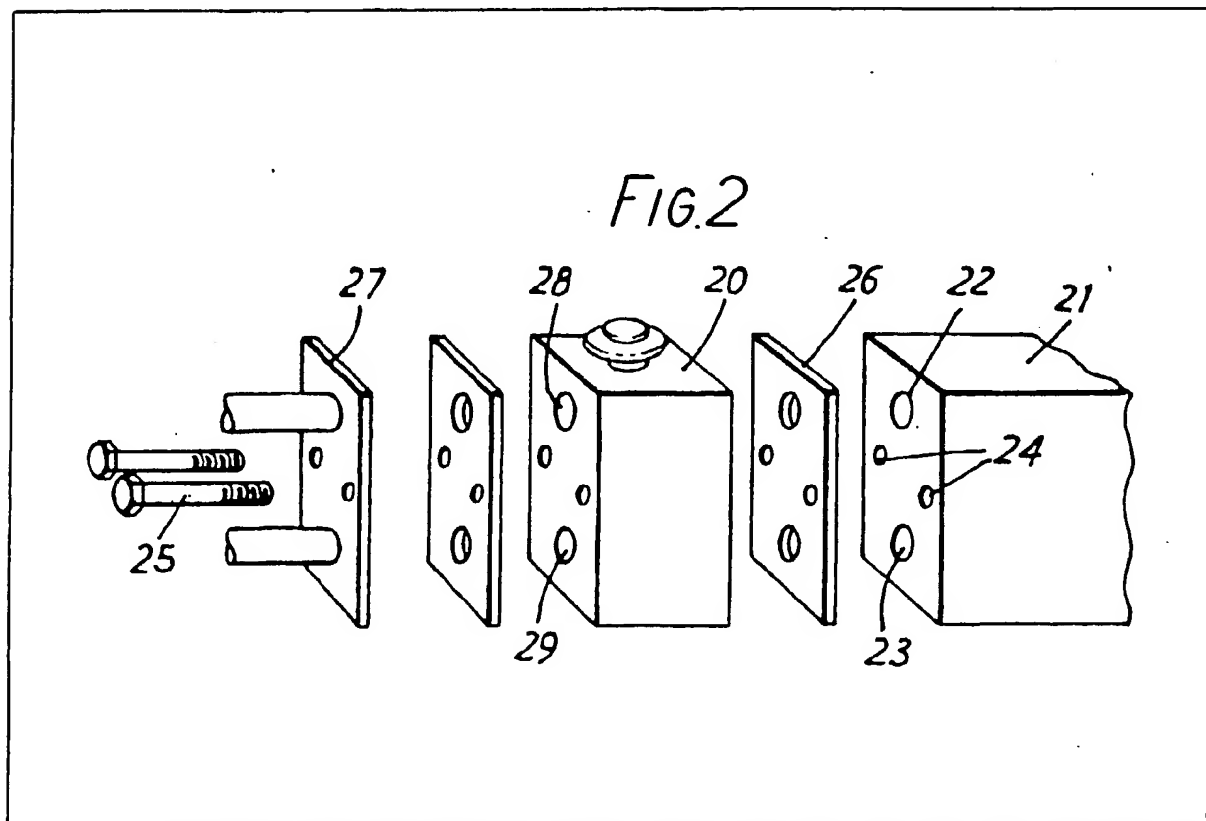
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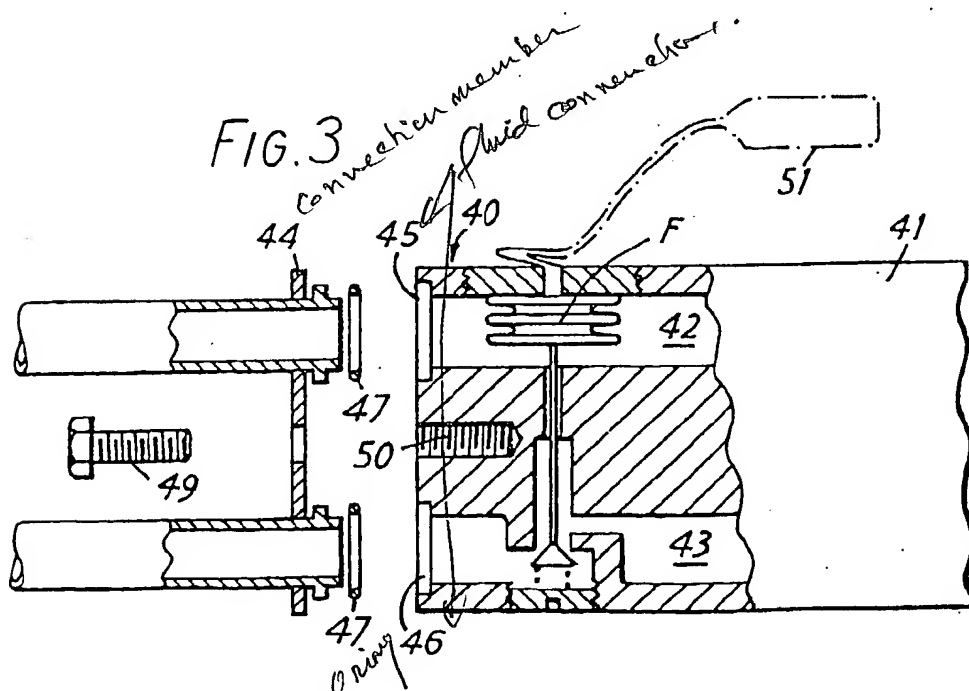
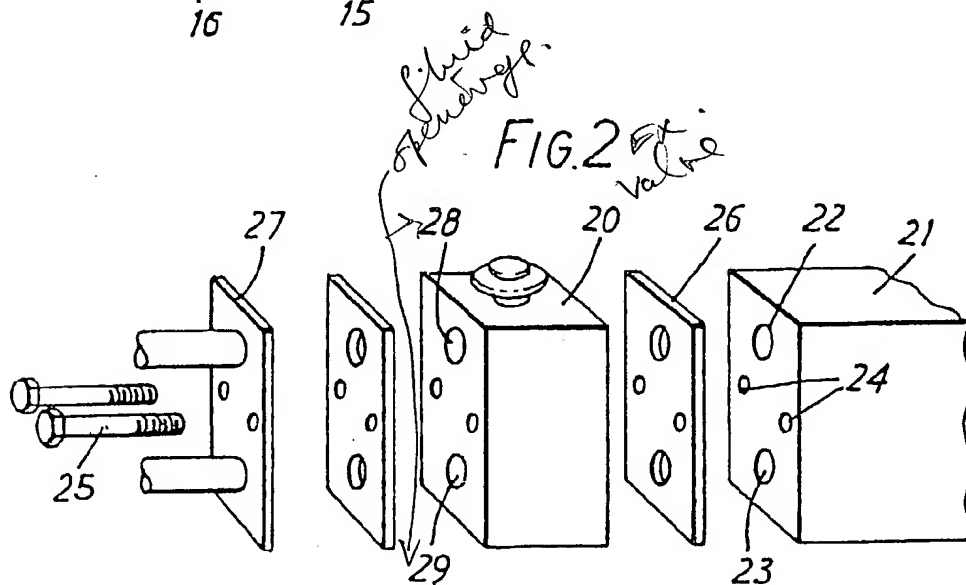
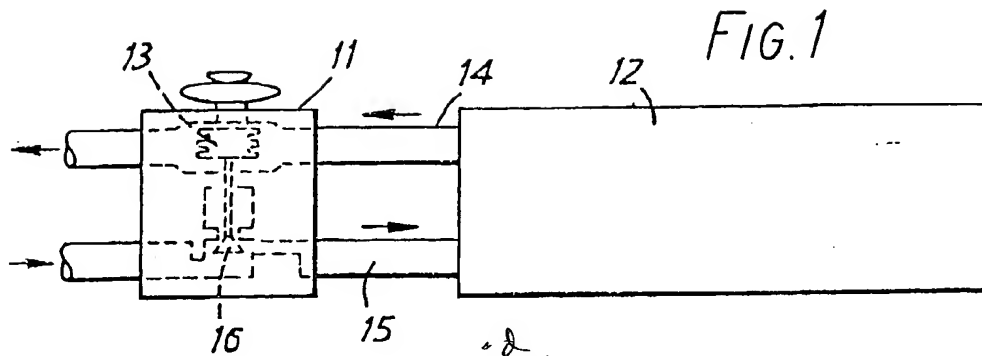
## (54) Refrigeration installation

(57) An expansion valve (20) and evaporator (21) for a refrigeration circuit are designed to be joined directly to one another without intermediate pipework. The ends of the evaporator and valve are formed as flat surfaces with fluid openings (22, 23) and openings (24) to take bolts. A gasket (26) seals the openings (22, 23) when the evaporator and valve are bolted together. The expansion valve comprises a temperature/pressure sensing capsule which is in contact with refrigerant leaving the evaporator and accordingly, controls the movement of a valve head located in the refrigerant supply line to the evaporator.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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## SPECIFICATION

## Refrigeration installation

- 5 This invention relates to refrigeration installations including an evaporator and an expansion valve.

The invention provides an evaporator and expansion valve for a refrigeration installation, which are housed either in an integral single body or in two housings having co-operating faces whereby they may be bolted together to form an effectively single body; said single body having internal passage ways located to direct refrigerant from the expansion valve to the evaporator and from the evaporator to temperature and/or pressure sensing elements of the expansion valve without the use of additional pipework.

- 20 According to one aspect, the two housings each have a flat end face with openings therein and means for bolting the flat faces together with the openings aligned. There may be a gasket or O-ring means for sealing the openings together.

There may also be a connector member carrying inlet and outlet pipes and means for bolting the connector member to a face of the expansion valve.

- 30 According to another aspect, the invention provides a method of assembly of an evaporator and expansion valve for a refrigeration installation as set forth above comprising locating the expansion valve on the evaporator so that the passage ways therein are aligned and bolting them together in that position.

According to another aspect, the invention provides a method of assembly of an evaporator and expansion valve for a refrigeration installation as set forth above comprising assembling the elements of the expansion valve into the same housing as the evaporator.

- The method of assembly may also include the step of bolting a connector member carrying inlet and outlet pipes to the expansion valve.

Specific embodiments of the invention are now described with reference to the accompanying drawings, in which:-

- 50 *Figure 1* is a diagrammatic representation of a known form of evaporator and expansion valve for a refrigerator,

*Figure 2* is one embodiment of evaporator and expansion valve according to the invention, and

- 55 *Figure 3* is a second embodiment of evaporator and expansion valve according to the invention.

Expansion valves as shown at 11 in *Fig. 1* carry out the function of maintaining a regulated supply of refrigerant on line 14 to the evaporator 12 of a refrigeration circuit. The regulation of the supply is dependent on the temperature and pressure of refrigerant leaving the evaporator. The expansion valve there-

fore comprises also a temperature and pressure sensing capsule 13 subjected to refrigerant leaving the evaporator on line 14. According to the temperature and pressure sensed,

- 70 valve head 16 is moved in the sense to increase or decrease the flow of refrigerant. As shown in *Figure 1*, the expansion valve requires connections to pipes which are in turn connected to the evaporator and also to outlet and inlet pipes. The installation therefore requires quite lengthy plumbing work.

According to one embodiment of the invention shown in *Fig. 2*, an expansion valve 20 and evaporator 21 are designed to be joined directly to one-another without intermediate piping. The end of the evaporator is formed as a flat surface with fluid openings 22, 23 and threaded openings 24 to take the ends of bolts 25.

- 85 The valve 20 is formed with a flat end surface having fluid openings (not shown) which can be aligned with the openings 22, 23 so that the valve may abut the flat end of the evaporator with the fluid openings connected. A gasket 26 is located between the valve and the evaporator.

On its other side, the valve 20 has another flat end surface which, when assembled, abuts a flat surface of a connection member 27. This surface also has two fluid openings 28, 29 which can be aligned with pipes 30, 31 secured to the connection member. A gasket 33 is located between the valve and the connection member.

- 100 The valve and evaporator may therefore be assembled by locating the flat surfaces together with the gaskets there-between, and passing the bolts 25 through aligned openings in the connection member, valve and gaskets to engage in the openings 24. The gaskets serve to seal the fluid connections so made between the various fluid openings. It will be appreciated that the fluid connections correspond to the connections of pipes 14, 15 of *Fig. 1*, but without any pipes. Moreover, the assembly is made by simply inserting the two bolts 25, and the possibility of incorrect pipe connections is avoided.

This invention is also embodied in *Fig. 3* by the expansion valve 40 being formed integrally with the evaporator body 41. The end of the evaporator body is formed with integral fluid lines 42, 43 into which the elements of the expansion valve are inserted. It will be seen that these elements are similar to those of *Fig. 1*, carrying out the same functions.

- A connection member 44, similar to member 27 of *Fig. 2*, carries inlet and outlet pipes which can be aligned with the fluid connections 45, 46 of the expansion valve, with O-rings 47 there-between. A bolt 49 passes through the connection member and engages in a threaded opening 50 in the evaporator body to clamp the assembly together. It will be seen that an even simpler assembly is pro-

vided in this embodiment, the expansion valve elements being inserted into a shaped opening at the end of the evaporator body and the connection member being then bolted on. The

- 5 evaporator body 41 is preferably moulded from plastics material with the internal shaping shown for the expansion valve. Alternatively, it could be fabricated or cast.

- For some refrigerator installations, the expansion valve is required to be sensitive to a more remote temperature, and for this purpose an exterior bulb 51 is connected to the sensing capsule. The bulb may then be positioned anywhere on the evaporator or a connection therefrom to detect the local temperature.
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#### CLAIMS

1. An evaporator and expansion valve for a refrigeration installation, which are housed either in an integral single body or in two housings having co-operating faces whereby they may be bolted together to form an effectively single body, said single body having internal passageways located to direct refrigerant from the expansion valve to the evaporator and from the evaporator to temperature and/or pressure sensing elements of the expansion valve without the use of additional pipework.
2. An evaporator and expansion valve as claimed in claim 1, housed in two housings each having a flat end face with openings therein and means for securing the flat faces together with the openings aligned.
3. An evaporator and expansion valve as claimed in claim 2, wherein there is sealing means between the openings.
4. An evaporator and expansion valve as claimed in any of claims 1 to 3, comprising also a connector member carrying inlet and outlet pipes and means for securing the connector member to another face of the expansion valve housing.
5. A method of assembling an evaporator and expansion valve as claimed in any of claims 1 to 4, comprising locating the expansion valve on the evaporator so that the passageways therein are aligned and securing them together in that position.
6. An evaporator and expansion valve substantially as described hereinbefore with reference to Fig. 2 or Fig. 3 of the accompanying drawings.
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